

REMARKS

This amendment is submitted in an earnest effort to bring this application to issue without delay.

Applicants wish to reiterate their claim to the benefit of their German priority date of 22 March 2004 pursuant to the International Convention. A certified copy of German Patent Application 10 2004 014 292.0 filed 22 March 2004 has been made of record in Applicants' PCT/EP 2005/001330 filed 10 February 2005 of which the instant application is the US National Phase. The Examiner has already acknowledged Applicants' perfected right of priority.

Applicants have made amendments to the specification on page 2, lines 9 through 22 and page 8, line 21 to remove some minor informalities. Applicants have inserted no new matter into the application.

Applicants have canceled claims 1, 2 and 6 through 10, and have added new claims 11 through 28. Antecedent basis for the new claims may be found in the specification on page 2, line 13 through page 10, line 2 and in Figures 1,2 and 3. Thus claims 11 through 28 are now in this application and are presented for examination.

All of the method claims now presented are written as method claims with positive steps. None of the claims now

presented contains parentheses, and none of the claims refers specially to any of the figures. Thus no claim now presented contains any of the wording to which the Examiner has objected with respect to the claims as last presented.

The Examiner has rejected all claims last presented as obvious under 35 USC 103 citing either the combination of either US Patent 7,183,326 to DAVEY et al and US Patent 6,248,794 to GIESKES or the combination of US Patent 6,248,794 to GIESKES together with US Patent 6,599,491 to VIDALIN. The Examiner argues that DAVEY et al discloses the same process as covered in the claims last presented to prepare methanol synthesis gas, ammonia synthesis gas, and carbon dioxide, except that DAVEY et al fails to show the actual production of the methanol, ammonia and urea. However, the examiner argues that GIESKES does disclose the preparation of all three products using a process that is analogous to the DAVEY et al process. Thus the Examiner believes that this combination of references renders all claims last presented as obvious. In addition the Examiner argues that GIESKES does disclose the preparation of methanol synthesis gas, ammonia synthesis gas and carbon dioxide, but does not disclose obtaining carbon dioxide from carbon monoxide. However, the VIDALIN reference discloses obtaining carbon dioxide from reaction of carbon monoxide and water, while at the same time preparing methanol and ammonia from natural gas and steam. The Examiner believes that this combination of references renders all claims last presented as obvious as well.

Applicants have canceled all claims last presented and are submitting new claims 11 through 28. New claims 11 and 12 cover the method as disclosed in Figure 1; new claims 13 through 20 cover the method as disclosed in Figure 2 and new claims 21 through 28 cover the method as disclosed in Figure 3. Applicants believe that all claims now presented are patentably distinguishable over the combination of DAVEY et al and GIESKES as well as patentably distinguishable over the combination of GIESKES and VIDALIN as will be explained hereinbelow.

The invention disclosed in DAVEY et al and the invention as claimed in the presently claimed invention are fundamentally different. DAVEY et al focuses on the simultaneous production of methanol synthesis gas, ammonia synthesis gas, carbon monoxide and carbon dioxide from natural gas. This is achieved by serially arranging several plant elements in a single production chain. The advantages gained by this method are due to the highly integrated layout of the plant and the reduced amount of plant elements necessary. If one looks at the gas flow in the DAVEY et al process, it is obvious that there is one single stream from the beginning of the process right to the end where separation of the gases for the different subsequent reactor units (not shown there) takes place. All of the reaction and treatment steps in DAVEY et al are executed on the whole gas stream (except the bypass 3).

On the contrary the present claims are directed to a process to produce methanol and ammonia simultaneously and

independently of each other ; see p. 1, line 24 through p. 2, line 2 of the present application.. There are two independent gas streams, one for the methanol synthesis gas feed and one for the ammonia synthesis gas feed. These two streams are generated by splitting the syngas stream right after Reactor A according to Figures 1, 2 and 3, and according to claim 11, step (b), claim 13, step (b), and claim 21, step (b). This split is one of the fundamental differences. DAVEY et al discloses a similar split of the syngas at the same place, but while the application splits the syngas into a smaller portion (2) for the direct feed of the methanol reactor and a larger portion (3) for the hydrogen generation for the ammonia reactor, DAVEY et al splits the syngas only to allow for a bypass (3) of the CO conversion reactor in order to be able to control the degree of CO conversion. As the methanol synthesis gas stream needs to contain CO, the CO converters of the application and DAVEY et al converters are operated different as well. In the presently claimed invention the CO content of the methanol synthesis gas stream is generated by the split portion of the syngas. Therefore unlike the DAVEY et al process, in the presently claimed process the CO converter operates at conditions to fully convert CO into CO₂ and to maximize production of hydrogen according to claim 11, step (c); claim 13, step (c) and claim 21, step (c). The DAVEY et al process requires maintaining a higher concentration of CO, because the CO content of the methanol synthesis gas is separated later as stream (6) from

absorber unit D and stream (8) from low-temperature separator unit E. Thus the need for the bypass (3).

Another feature different between the DAVEY et al process and the presently claimed invention is the split of the pure hydrogen stream in purification unit D into stream (6) according to Figures 1 and 3, and in compressor/absorber unit C into stream (6) according to Figure 2 for adjusting the hydrogen concentration in the methanol synthesis gas stream in order to control the S_n value to obtain the desired stoichiometric ratio of 2.05 and stream (8) for the ammonia reactor feed. See claim 11, steps (d), (e) and (f); claim 21, steps (d), (e), (f) and (g) and claim 13, steps (e), (f) and (g), respectively.

These fundamental differences between the presently claimed process and the DAVEY et al process can not be overcome by the combination of DAVEY et al with GIESKES, because the adding of the methanol and ammonia reactors to the process, missing in DAVEY et al, according to GIESKES alone would not lead to processes for preparing either methanol or ammonia using parallel and independent streams of syngas. Furthermore the changes necessary to the composition of the gas streams in the hydrogen and carbon dioxide levels in the DAVEY et al process as explained hereinabove in order to make the parallel syngas stream concept work would not be obvious either from GIESKES.

Regarding the plant layout disclosed by GIESKES, once again that layout lacks the parallel and independent production of

methanol and ammonia as well. First of all, GIESKES does not disclose a layout where methanol and ammonia are produced together at all. The central plant feature common to all embodiments in the reference is the Fischer-Tropsch (FT) process section, which is combined with other processes in order to obtain synergy effects. Even a combination of the embodiments shown in Figs. 4 and 7 would still lack the two independent syngas streams. As can be seen in Fig. 7, the syngas for the methanol synthesis is produced in a steam reformer (106), while the syngas for the FT reactor is produced in a separate thermal reformer. So there is no syngas split as in the presently claimed process, but a split of the pretreated gas stream right after the gas processing unit. In Fig. 4, stream (35), which is the syngas stream leaving thermal reformer (32), there is not split either. The complete stream is passed through the hydrogen separation unit (56) and separated into a hydrogen stream (58) and a CO rich stream (60) which is fed to the FT reactor. A portion of the hydrogen stream (58) is separated as stream (59) for the wax upgrade unit and the rest is fed as stream (63) to the ammonia reactor (90). So the FT process part of the plant is dependent on the ammonia synthesis part by the essential streams (60) and (59). Or seen from the FT process as the main stream, the ammonia synthesis gets its hydrogen as a by-product of the FT process. This dependence on an external process is exactly what the presently claimed process eliminates according to the

presently claimed invention with its controlled conversion of the syngas to maximize hydrogen production.

As the basic plant layout of the GIESKES process is clearly different from the process as covered in all of the present claims, the combination of the GIESKES process with the feature of a CO conversion unit as described by VIDALIN would not lead those skilled in the art to create a process layout as covered by Applicants' claims now presented. Only the idea of creating parallel and independent production pathways while keeping the level of integration high (use of an air separation unit to feed the Reactor A and ammonia Reactor F and/or the purification unit D, fueling Reactor A with the separated impurities of absorber unit C and purification unit D) leads to the plant layout of the presently claimed invention.

In the case of VIDALIN it is even doubtful, if a person skilled in the art would have taken the document into consideration, because the problem dealt with is completely different from the one posed in the present application; VIDALIN provides a method for converting an existing methanol or methanol/ammonia plant to operate depending on market conditions in a methanol production mode or a hydrogen production mode, using hydrocarbons or lower alkanols as starting materials (col. 2, line 64 through col. 3, line 8). The target of VIDALIN is to modify an existing plant to be able to react with production flexibility on the changing market conditions. Therefore the reference process

includes a feature to shut down the methanol synthesis part of the plant in favor of hydrogen production. The presently claimed process on the other hand targets a highly efficient and integrated plant design for the simultaneous and independent production of methanol and ammonia. Flexibility in the amounts of methanol and ammonia produced is given by the operation conditions of reformer unit A.

Applicants especially point to the new dependent claims 12, 14, and 22 directed to the explicit combination of a steam reformer with a Compact Partial Oxidation (CPDX) Reactor as the syngas reactor unit A, a preferred feature of the presently claimed invention. As discussed above the process in claims 12, 14 and 22 also involves two independent syngas streams; one for methanol and one for ammonia. Such a process is neither disclosed nor suggested by the cited combination of prior art references.

In view of the above Applicants believe that neither of the combinations of the prior art references provides any basis to reject any claim now presented as obvious under 35 USC 103.

Applicants believe that all claims now presented are allowable and a response to that effect is earnestly solicited.

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